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(2) shade, increasing permanency; (3) wind, tending to decrease duration; (4) moisture, tending to lengthen duration; and (5) bog habitat, causing the same early fall as dry habitat. In general, factors which cause increase in transpiration are accompanied by decrease in leaf duration, while those factors tending toward decrease in photosynthetic activity are accompanied by increased duration. The author of the paper is to be commended upon its good organization.—GEO. D. FULLER.

Physical factors in plant distribution.—The recent advances along the line of devoting more attention to the factors controlling vegetation and the progress made in more correctly evaluating these factors have been discussed by SHREVE,¹⁵ who has also pointed out the striking contrasts in the physical conditions of mountains in humid and arid regions.¹⁶ The contrasts in humidity are most marked, but are manifest also in temperature and light. Examples are seen in the Blue Mountains of Jamaica, with a daily temperature range of 6–10°, compared with the Santa Catalina Mountains of Arizona, with a daily range of 40–65° and corresponding annual amplitudes. These and other differences enumerated result in plant associations where a stratified rain forest in the former region, with large trees, under trees, shrubs, large herbs, and small hygrophilous plants superimposed in luxuriant profusion, contrasts with the scanty shrubs, the open pine forests, and somewhat denser fir forests, all almost devoid of any stratification whatever, which are distributed over the slopes of the latter.—GEO. D. FULLER.

Anatomy of Betulaceae.—The intensive anatomical work among the gymnosperms has forged an unusually effective weapon for attacking phylogeny, and it is beginning to be used in the interpretation of angiosperms, with very interesting results. HOAR¹⁷ has investigated the anatomy of the Betulaceae and has come to the conclusion that the group belongs “near the base of the dicotyledons,” and that *Alnus* most clearly illustrates the primitive conditions. In this genus the aggregate condition of rays is either normally developed or in a state of reduction, while in the more advanced genera (*Carpinus*, *Ostrya*, and *Betula*) the aggregate condition persists only in conservative regions or is “recalled by injuries.” The conclusion of course depends upon the position of the aggregate ray in the phylogenetic series of ray structures. In the same connection *Casuarina* was investigated, the result being to confirm its low position among the dicotyledons, and also its close anatomical relation-

¹⁵ SHREVE, FORREST, The weight of physical factors in the study of plant distribution. *Plant World* 19:53–67. 1916.

¹⁶ ———, The physical control of vegetation in rain forest and desert mountains. *Plant World* 20:135–141. 1917.

¹⁷ HOAR, CARL S., The anatomy and phylogenetic position of the Betulaceae. *Amer. Jour. Bot.* 3:415–435. pls. 16–19. 1916.

ship with the Amentiferae. In fact, this relationship is one argument for the primitive character of the Amentiferae.—J. M. C.

Translocation of sugar.—MANGHAM¹⁸ has attempted to show that adsorption in the complex colloidal system of the protoplasm may play an important rôle in the translocation of sugar in the plant. The discussion is purely hypothetical, and it is rather hard to see how the main hypothesis is to be put on an experimental basis. A quotation from his summary will show the line of his reasoning.

Adsorption compounds of albumen, lecithin, and glucose are known. It is suggested that in vegetable protoplasm there are present constituents capable of adsorbing sugars from solution. For any given concentration of sugar present in the liquid phase of the protoplasm, and the cell sap continuous with it, there would be a definite concentration of sugar present at the adsorbing surface. Any alteration of concentration in either region would lead to a readjustment of concentration equilibrium, which would be propagated as a wave through the system composed of the adsorbing particles and the solution immediately in contact with them. The rate of propagation of this wave would depend very much upon the degree of approximation of the particles under consideration, and would increase as the distance between them decreased. Connecting threads are assumed to provide a continuous protoplasmic pathway, though they impose restrictions varying with their frequency and tenuity.

Diffusion is generally recognized as being too slow to account for the considerable movement of sugars and other materials in plants. There must be mass movement to supplement molecular movements. MANGHAM's hypothesis does not help us out in this respect because it must assume that "readjustment of concentration equilibrium" is brought about by diffusion so far as movement of the sugar molecule is concerned. The line between adsorption compounds and compounds due to chemical reactions is by no means a sharp one. In fact, it is one of the great battle lines in physical chemistry. One seriously doubts whether anything is gained by his assumption of adsorption compounds. There is much more evidence to support his view that sugar travels from cell to cell mainly by protoplasmic connections rather than by passing through the ectoplast, which is almost impermeable to sugar.—WM. CROCKER.

Physiological diseases.—BONCQUET¹⁹ claims to have solved the mystery of certain plant diseases of the so-called physiological type, such as curly top

¹⁸ MANGHAM, SYDNEY, On the mechanism of translocation in plant tissues. A hypothesis, with special reference to sugar conduction in sieve tubes. *Ann. Botany* 31:293-311. 1917.

¹⁹ BONCQUET, P. A., Presence of nitrites and ammonia in diseased plants. *Jour. Amer. Chem. Soc.* 38:2572-2576. 1916.

BONCQUET, P. A., and BONCQUET, MARY, Presence of nitrites and ammonia in diseased plants. II. Oxidases and diastases; their relation to the disturbance. *Jour. Amer. Chem. Soc.* 39:2088-2093. 1917.